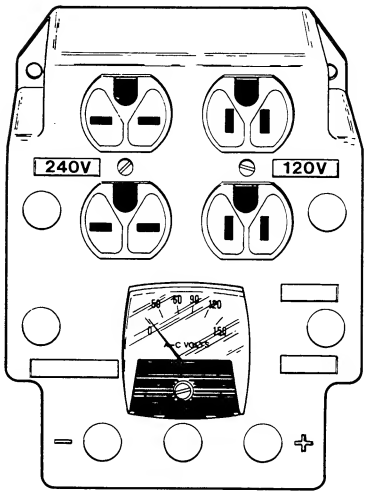
Onan

Operators and Parts Manual

1.7-6.5 kW

YCB

Alternators



- **Belt-Driven Two Bearing Alternators**

919-0308
Spec H and J
5-82

Safety Precautions

The following symbols in this manual signal potentially dangerous conditions to the operator or equipment. Read this manual carefully. Know when these conditions can exist. Then take necessary steps to protect personnel as well as equipment.

WARNING ***This symbol is used throughout this manual to warn of possible serious personal injury.***

CAUTION ***This symbol refers to possible equipment damage.***

GUARD AGAINST ELECTRIC SHOCK

- Use extreme caution when working with electrical equipment. High voltage currents may cause injury or death.
- Follow all state and local electrical codes: Have all electrical installations performed by a qualified licensed electrician.
- When working around electrical equipment, move cautiously to avoid shocks.
- Do not lunge after falling tools.
- Do not examine live equipment when mentally or physically fatigued.
- Disconnect electric power before removing protective shields or touching electrical equipment.
- Use rubber insulative mats placed on dry wood platforms over floors that are metal or concrete when around electrical equipment. Do not wear damp clothing (particularly wet shoes) or allow skin surfaces to be damp when handling electrical equipment.
- Jewelry is a good conductor of electricity and should be removed when working on electrical equipment.
- Do not connect the alternator directly into a utility power receptacle to provide emergency power. It is possible for current to flow from the alternator into the utility line. This creates an extreme hazard for anyone working on lines to restore power.

EXHAUST GASES ARE TOXIC

- Engine exhaust contains CARBON MONOXIDE, a dangerous gas that is potentially lethal. Avoid carbon monoxide inhalation by providing an adequate exhaust system for the driving power source.
- Discharge all engine exhaust gases directly into the open air and away from buildings and enclosures. Check the exhaust system frequently for leaks.

PROTECT AGAINST MOVING PARTS

- Avoid moving parts of the unit. Loose jackets, shirts or sleeves should not be worn because of the danger of becoming caught in moving parts.
- Make sure all nuts and bolts are secure. Keep power shields and guards in position.
- If adjustments *must* be made while the unit is running, use extreme caution around moving parts, etc.
- Before servicing alternator always:
  1. Disengage all power.
  2. Shut off engine.
  3. Wait until rotor stops.

FIRE EXTINGUISHERS

- It is a good practice to have a fire extinguisher nearby. Be sure that the extinguisher is properly maintained and be familiar with its proper use.
- Extinguishers rated ABC by the NFPA are appropriate for all applications. Consult the local fire department for the correct type of extinguisher for various applications (note power must be turned off before electrical fire can be extinguished).

KEEP THE UNIT AND SURROUNDING AREA CLEAN

- Remove oil, grease, ice, snow or materials that create slippery conditions around unit.
- Remove oily rags and other materials that create potential fire hazards.

Important Safety Precautions

Read and observe these safety precautions when using or working on electric generators, engines and related equipment. Also read and follow the literature provided with the equipment.

Proper operation and maintenance are critical to performance and safety. Electricity, fuel, exhaust, moving parts and batteries present hazards that can cause severe personal injury or death.

FUEL, ENGINE OIL, AND FUMES ARE FLAMMABLE AND TOXIC

Fire, explosion, and personal injury can result from improper practices.

- Used engine oil, and benzene and lead, found in some gasoline, have been identified by government agencies as causing cancer or reproductive toxicity. When checking, draining or adding fuel or oil, do not ingest, breathe the fumes, or contact gasoline or used oil.
- Do not fill tanks with engine running. Do not smoke around the area. Wipe up oil or fuel spills. Do not leave rags in engine compartment or on equipment. Keep this and surrounding area clean.
- Inspect fuel system before each operation and periodically while running.
- Equip fuel supply with a positive fuel shutoff.
- Do not store or transport equipment with fuel in tank.
- Keep an ABC–rated fire extinguisher available near equipment and adjacent areas for use on all types of fires except alcohol.
- Unless provided with equipment or noted otherwise in installation manual, fuel lines must be copper or steel, secured, free of leaks and separated or shielded from electrical wiring.
- Use approved, non-conductive flexible fuel hose for fuel connections. Do not use copper tubing as a flexible connection. It will work–harden and break.

EXHAUST GAS IS DEADLY

- Engine exhaust contains carbon monoxide (CO), an odorless, invisible, poisonous gas. Learn the symptoms of CO poisoning.
- Never sleep in a vessel, vehicle, or room with a genset or engine running unless the area is equipped with an operating CO detector with an audible alarm.
- Each time the engine or genset is started, or at least every day, thoroughly inspect the exhaust system. Shut down the unit and repair leaks immediately.
- Warning: Engine exhaust is known to the State of California to cause cancer, birth defects and other reproductive harm.

Make sure exhaust is properly ventilated.

- Vessel bilge must have an operating power exhaust.
- Vehicle exhaust system must extend beyond vehicle perimeter and not near windows, doors or vents.
- Do not use engine or genset cooling air to heat an area.
- Do not operate engine/genset in enclosed area without ample fresh air ventilation.
- Expel exhaust away from enclosed, sheltered, or occupied areas.
- Make sure exhaust system components are securely fastened and not warped.

MOVING PARTS CAN CAUSE SEVERE PERSONAL INJURY OR DEATH

- Do not remove any guards or covers with the equipment running.
- Keep hands, clothing, hair, and jewelry away from moving parts.
- Before performing any maintenance, disconnect battery (negative [–] cable first) to prevent accidental starting.
- Make sure fasteners and joints are secure. Tighten supports and clamps, keep guards in position over fans, drive belts, etc.
- If adjustments must be made while equipment is running, use extreme caution around hot manifolds and moving parts, etc. Wear safety glasses and protective clothing.

BATTERY GAS IS EXPLOSIVE

- Wear safety glasses and do not smoke while servicing batteries.
- Always disconnect battery negative (–) lead first and reconnect it last. Make sure you connect battery correctly. A direct short across battery terminals can cause an explosion. Do not smoke while servicing batteries. Hydrogen gas given off during charging is explosive.
- Do not disconnect or connect battery cables if fuel vapors are present. Ventilate the area thoroughly.

DO NOT OPERATE IN FLAMMABLE AND EXPLOSIVE ENVIRONMENTS

Flammable vapor can be ignited by equipment operation or cause a diesel engine to overspeed and become difficult to stop, resulting in possible fire, explosion, severe personal injury and death. **Do not operate diesel equipment where a flammable vapor environment can be created by fuel spill, leak, etc., unless equipped with an automatic safety device to block the air intake and stop the engine.**

HOT COOLANT CAN CAUSE SEVERE PERSONAL INJURY

- Hot coolant is under pressure. Do not loosen the coolant pressure cap while the engine is hot. Let the engine cool before opening the pressure cap.

ELECTRICAL SHOCK CAN CAUSE SEVERE PERSONAL INJURY OR DEATH

- Do not service control panel or engine with unit running. High voltages are present. Work that must be done while unit is running should be done only by qualified service personnel.
- Do not connect the generator set to the public utility or to any other electrical power system. Electrocution can occur at a remote site where line or equipment repairs are being made. An approved transfer switch must be used if more than one power source is connected.
- Disconnect starting battery (negative [–] cable first) before removing protective shields or touching electrical equipment. Use insulative mats placed on dry wood platforms. Do not wear jewelry, damp clothing or allow skin surface to be damp when handling electrical equipment.
- Use insulated tools. Do not tamper with interlocks.
- Follow all applicable state and local electrical codes. Have all electrical installations performed by a qualified licensed electrician. Tag open switches to avoid accidental closure.
- With transfer switches, keep cabinet closed and locked. Only authorized personnel should have cabinet or operational keys. Due to serious shock hazard from high voltages within cabinet, all service and adjustments must be performed by an electrician or authorized service representative.

If the cabinet must be opened for any reason:

1. Move genset operation switch or Stop/Auto/Handcrank switch (whichever applies) to Stop.
2. Disconnect genset batteries (negative [–] lead first).
3. Remove AC power to automatic transfer switch. If instructions require otherwise, use extreme caution due to shock hazard.

MEDIUM VOLTAGE GENERATOR SETS (601V TO 15kV)

- Medium voltage acts differently than low voltage. Special equipment and training are required to work on or around medium voltage equipment. Operation and maintenance must be done only by persons trained and qualified to work on such devices. Improper use or procedures will result in severe personal injury or death.
- Do not work on energized equipment. Unauthorized personnel must not be permitted near energized equipment. Induced voltage remains even after equipment is disconnected from the power source. Plan maintenance with authorized personnel so equipment can be de-energized and safely grounded.

GENERAL SAFETY PRECAUTIONS

- Do not work on equipment when mentally or physically fatigued or after consuming alcohol or drugs.
- Carefully follow all applicable local, state and federal codes.
- Never step on equipment (as when entering or leaving the engine compartment). It can stress and break unit components, possibly resulting in dangerous operating conditions from leaking fuel, leaking exhaust fumes, etc.
- Keep equipment and area clean. Oil, grease, dirt, or stowed gear can cause fire or damage equipment by restricting airflow.
- Equipment owners and operators are solely responsible for operating equipment safely. Contact your authorized Onan/Cummins dealer or distributor for more information.

KEEP THIS DOCUMENT NEAR EQUIPMENT FOR EASY REFERENCE.

Table of Contents

General Information

This manual contains information covering installation, operation, and maintenance of the alternator. Study this manual carefully and observe all warnings and cautions. Following the recommended installation guidelines and using the alternator properly will result in longer alternator life, better performance, and safer operation.

The alternator is a revolving field two pole design that produces the specified nameplate voltage when operated at 3600 RPM. Driving power must be provided by a separate power source such as a gasoline engine.

SPECIFICATIONS

Model Number	Power Output	Voltage	RPM	Shaft Diameter	Approx. Weight (Mass)
1.7YCB-1S	1750 Watts	120	3600	7/8 in. (222 mm)	36 (16 kg)
2.2YCB-1S	2250 Watts	120	3600	7/8 in (222 mm)	40 (18 kg)
3.0YCB-3S	3000 Watts	120/240	3600	7/8 in (222 mm)	47 (21 kg)
3.7YCB-3S	3750 Watts	120/240	3600	7/8 in (222 mm)	54 (24 kg)
5.0YCB-3S	5000 Watts	120/240	3600	7/8 in (222 mm)	65 (29 kg)
6.5YCB-3S	6500 Watts	120/240	3600	7/8 in (222 mm)	80 (36 kg)

WARNING

MANUFACTURER RECOMMENDS THAT ALL SERVICE INCLUDING INSTALLATION OF REPLACEMENT PARTS BE DONE BY QUALIFIED ELECTRICAL AND/OR MECHANICAL SERVICE PERSONNEL. TO PREVENT POSSIBLE INJURY AND/OR EQUIPMENT DAMAGE IT IS IMPORTANT THAT ALL SERVICE PERSONNEL BE QUALIFIED.

Installation

GENERAL

Read through this entire section before beginning the installation. The complete installation must comply with all local and state building codes, fire ordinances, and other regulations that may apply.

Installation considerations include the following:

1. Location
2. Mounting
3. Driving Power
4. Pulley Selection
5. Belt Alignment

LOCATION

A proper location includes good ventilation, convenience to driving power, good operating conditions, and servicing convenience.

Convenience To Driving Power

The alternator should be mounted as close as practical to the driving power source to minimize drive belt length. Both the alternator and the driving source must be securely bolted to a heavy mounting base to maintain pulley and shaft alignment. It should also be possible to make small adjustments in the location of the alternator or power source to allow for adjustments in drive belt tension.

Driving Power Exhaust

A gasoline engine is generally used as the driving power source for the alternator. If operating indoors, provide an adequate exhaust system to pipe exhaust gases to the outside of any enclosure. Locate the exhaust outlet away from any air inlets to avoid exhaust gases re-entering the enclosure. Make regular and frequent inspections of the exhaust system to make sure the entire system remains fume tight and safe for operation.

Model Number	Dim. A - Overall Length	Dim. B. - Mounting Base Length
1.7YCB-1S	15.04 (382 mm)	6.5 (165 mm)
2.2YCB-1S	15.41 (392 mm)	6.5 (165 mm)
3.0YCB-3S	16.16 (411 mm)	6.5 (165 mm)
3.7YCB-3S	16.66 (424 mm)	6.5 (165 mm)
5.0YCB-3S	17.66 (449 mm)	8.5 (216 mm)
6.5YCB-3S	19.16 (487 mm)	8.5 (216 mm)

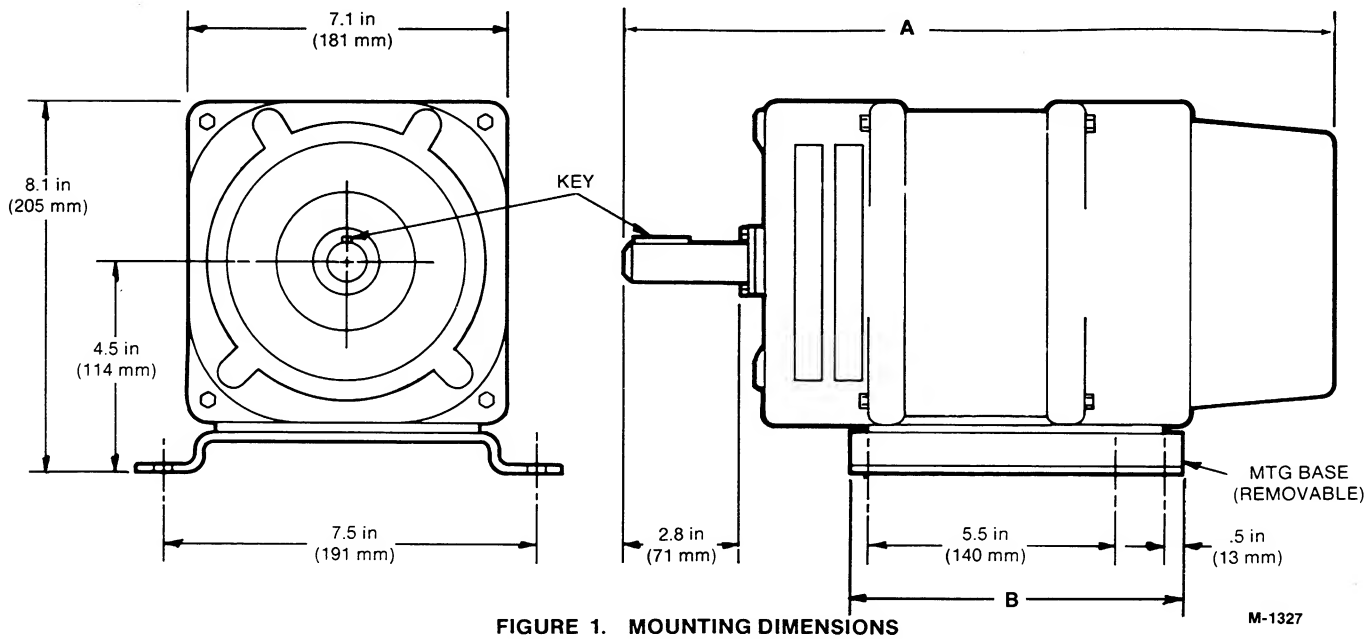


FIGURE 1. MOUNTING DIMENSIONS

WARNING ***Utilizing exhaust manifold heat to warm a room or compartment occupied by people is not recommended due to possible leaking of harmful exhaust gases.***

If operating outdoors, direct the exhaust into the open air away from windows, doors, air intakes, or any other place where exhaust gases may enter the interior of a building. Do not discharge exhaust gases into any type of enclosure that may allow exhaust fumes to accumulate.

Ventilation

The alternator creates considerable heat when operating under load conditions. The heat generated by the alternator must be dissipated through proper ventilation. If the alternator is installed inside a small room or compartment, provide a vent for exhausting heated air. Heated air is discharged through the drive shaft end of the alternator.

CAUTION ***Overheating of the alternator can result in poor voltage regulation, alternator damage or failure.***

Operating Conditions

Avoid extremely dusty or damp conditions. Protect the alternator against the weather by covering it or moving it to the inside of a building.

Servicing Convenience

Allow at least 24 inches of space on all sides of the alternator for convenient servicing.

MOUNTING

Provide a substantial mounting base of concrete, wood or steel and use large bolts. The mounting surface must be flat so that the mounting brackets are not distorted when tightened into place. It must be possible to easily turn the alternator shaft by hand after the alternator is bolted down. Refer to Figure 1 for mounting dimensions.

DRIVING POWER

When using a gasoline engine as the driving source, consider the following:

Engine Power

The engine must provide a minimum of 2 HP for each 1000 watts of alternator output. For example, if operating a 3000 watt alternator, the engine must deliver at least 6 HP at the drive shaft. If the engine has a considerable reserve of power, speed regulation and voltage regulation will be more consistent. Shaft rotation in either direction is possible.

Engine Speed Regulation

Engine speed directly affects alternator voltage and frequency. To maintain voltage and frequency within acceptable limits, it is important that engine speed be almost constant during alternator operation. The engine speed must not drop too much when a load is applied and not speed up too much when a load is removed.

Low alternator speed will result in low voltage and frequency. Slowing the alternator speed from 3600 RPM to 3300 RPM will drop the frequency from 60 cycles to 55 cycles and drop the voltage from 120 volts to 110 volts. Similarly, increasing the engine speed will result in a higher frequency and voltage.

CAUTION ***The combination of low voltage and frequency could result in burned out windings of any compressor motor connected to the alternator such as refrigerators and air conditioners. High voltage and frequency can result in alternator failure.***

Governors: To regulate engine speed, the engine should be equipped with a governor. The two basic types of governors used are the variable speed and the constant speed.

Variable speed governors are used with engines that normally operate over a wide range of speeds. They typically regulate engine speed at approximately 8.5 to 12 percent. Governor operation is usually best when the engine is operated at its maximum speed.

CAUTION ***The variable speed governor does not react fast enough at low speeds to prevent momentary acceleration and high voltage. This can result in serious damage to any electrical equiment left connected to the unit.***

Constant speed governors are used with engines that run at a fixed speed. They typically regulate engine speed at approximately 5 percent or less.

Of the two types of governors, the constant speed type is preferred because of the closer regulation it provides. If the engine governor does not provide proper speed regulation, it may be necessary to manually adjust the engine throttle control when the load is changed.

PULLEY SELECTION

Select heavy duty pulleys that are constructed from a durable material such as cast iron or steel. The pulleys must be strong enough to withstand the heavy loading that will be placed on them by the alternator and engine. In addition, the pulley groove angle must be compatible with the V angle of the drive belt.

The rated speed of the engine determines the size of the pulley to use on the alternator. To determine the correct alternator pulley size, proceed as follows:

1. Multiply the diameter of the driving unit pulley by its speed in rpm (revolutions per minute).
2. Divide the above by the nameplate speed of the alternator (3600 rpm).

The result gives the diameter of the pulley required on the alternator.

For example: A pulley 6 inches in diameter is used on an engine operating at 2400 rpm. Multiply 6 x 2400 getting a result of 14,400. Divide the 14,400 by 3600 rpm (alternator pulley speed desired) and the final result is 4. This is the size of the pulley required on the alternator (4 inches).

The alternator pulley should not be smaller than 2-1/2 inches in diameter or belt life will be significantly reduced.

BELT SELECTION AND ALIGNMENT

Select a "High Capacity" 3/8 inch (3V) or larger V-belt as a drive belt for the alternator. For alternators larger than 3000 watts, a double pulley with two belts is recommended. This will increase belt life and provide better speed and voltage regulation.

The pulleys must rotate in the same plane for longest belt life and lower bearing loads. Use a straight edge to align the pulleys as shown in Figure 2.

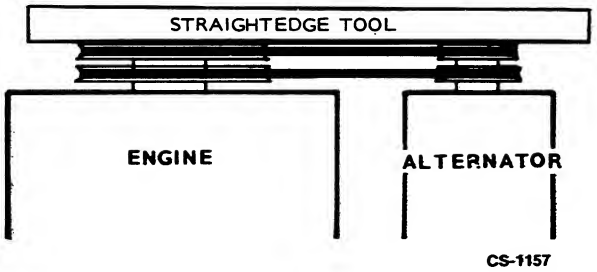


FIGURE 2. BELT ALIGNMENT

BELT WRAP

The greater the degree of belt wrap the less slippage that occurs. The amount of belt wrap should not be less than 120 degrees for satisfactory operation. See Figure 3.

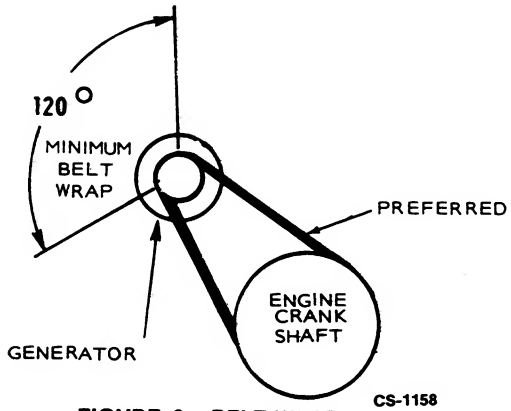


FIGURE 3. BELT WRAP

Operation

STARTING

Disconnect all loads from the alternator and start the driving power source. Allow the power source to reach operating temperature and then check the voltage. With no loads connected, the voltmeter (see Figure 4) should read **126 volts.**

Adjust the speed of the driving power source as required to obtain the reference voltage. The alternator must be driven at approximately 3600 rpm to produce its rated voltage.

The AC voltage should quickly build up as soon as the driving power source is started. If no AC voltage is present, it is possible that the alternator field laminations have lost their residual magnetism. This can happen when the alternator is not used for long periods of time or if the alternator is dropped. Contact an authorized service center for assistance if no AC voltage is present.

CONNECTING A LOAD

If practical, allow the alternator engine to warm up before connecting a load. Receptacles are located on a panel on the end of the alternator as shown in Figure 4. Connect the load by inserting the load wire plugs into the proper output receptacle.

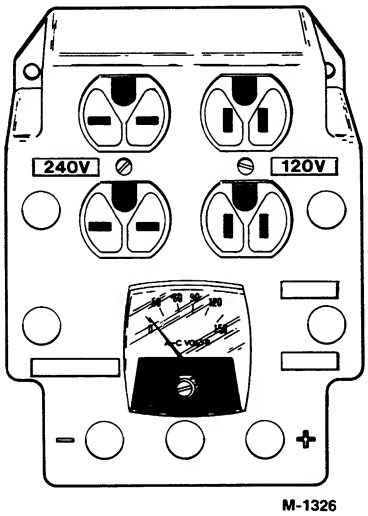


FIGURE 4. RECEPTACLE PANEL

Power Output Rating

The alternator maximum power output is stamped on the nameplate. Do not exceed the maximum power rating by connecting too many loads. Continuous overloading will cause high operating temperatures that can damage the alternator.

To determine if the load is within the maximum power output rating of the alternator, add up the wattage requirements of all the electrical loads that will be operated simultaneously. Most appliances or tools have the wattage requirements imprinted on the nameplate. Table 1 can be used as a guide if the wattage requirements are not listed on the equipment. The total should be LESS than the maximum power output rating of the alternator.

TABLE 1

POWER REQUIREMENTS FOR APPLIANCES

Appliance or Tool	Approximate Running Wattage
Air Conditioner	800-4000
Attic Fan	375
Battery Charger	Up to 800
Broiler	1325
Clothes Dryer	4500
Clothes Washer	250-1000
Coffee Percolator	550-700
Dishwasher (conventional)	300
Dishwasher (heating element)	1150
Electric Blanket	50-200
Electric Broom	200-500
Electric Drill	250-750
Electric Frying Pan	1000-1350
Electric Iron	500-2000
Electric Saw	400-1500
Electric Stove (per element)	350-1000
Electric Water Heater	1000-1500
Electric Water Pump	500-600
Freezer	300-1000
Furnace Fan	225
Garbage Disposal Unit	325
Hair Dryer	350-500
Space Heater	1000-1500
Microwave Oven	700-1500
Oil Burner	250
Radio	50-200
Refrigerator	600-1000
Sump Pump	250-500
Television	200-600
Vacuum Cleaner	500-1500
Well Water Pump	250-1000

When electric motors are connected, connect one at a time. Allow each motor to reach running speed before connecting another. Electric motors require much more current for starting than when running at normal speed. Connecting several motors at the same time can result in an alternator overload condition. Should this occur none of the motors will start.

MAINTENANCE

The alternator normally needs little maintenance other than a yearly check of the brushes and collector rings by an authorized service center. If a major repair job on the alternator should become necessary, the equipment must be checked by a competent electrician who is thoroughly familiar with the operation of electric alternators.

BELT ADJUSTMENT

Maintain proper belt tension at all times. Too much belt tension causes rapid wear of the belts and places an extra load on the alternator bearings. Belts that are too loose will slip, wear out rapidly and cause the alternator to run at a low speed. Reduced alternator speed causes lower output voltage.

To test the V-belt tension, press down on the belt at a point midway between the driving unit and the alternator while not in operation. It should be possible to press the belt down a slight amount depending on the distance between the pulleys. When more than one belt is used, each belt should show the same tension. When it becomes necessary to replace a worn belt, replace all belts at the same time.

A new belt will stretch slightly when first put into operation. Tension should be checked frequently during the first week or two of operation. After this period, further belt tension adjustment should be minimal.

The driving unit and alternator pulleys must be in alignment. To test alignment place a straight edge tool against the side of the outer driving pulley. See Figure 2. As the straight edge contacts both sides of the driving unit pulley, it should contact both sides of the alternator pulley. Complete contact of both pulleys should be made at the same time.

WARNING

EXHAUST GAS IS DEADLY!

Exhaust gases contain carbon monoxide, a poisonous gas that might cause unconsciousness and death. It is an odorless and colorless gas formed during combustion of hydrocarbon fuels. Symptoms of carbon monoxide poisoning are:

- ***Dizziness***
- ***Headache***
- ***Weakness and Sleepiness***
- ***Vomiting***
- ***Muscular Twitching***
- ***Throbbing in Temples***

If you experience any of these symptoms, get out into fresh air immediately, shut down the unit and do not use until it has been inspected.

The best protection against carbon monoxide inhalation is proper installation and regular, frequent inspections of the complete exhaust system. If you notice a change in the sound or appearance of exhaust system, shut the unit down immediately and have it inspected and repaired at once by a competent mechanic.

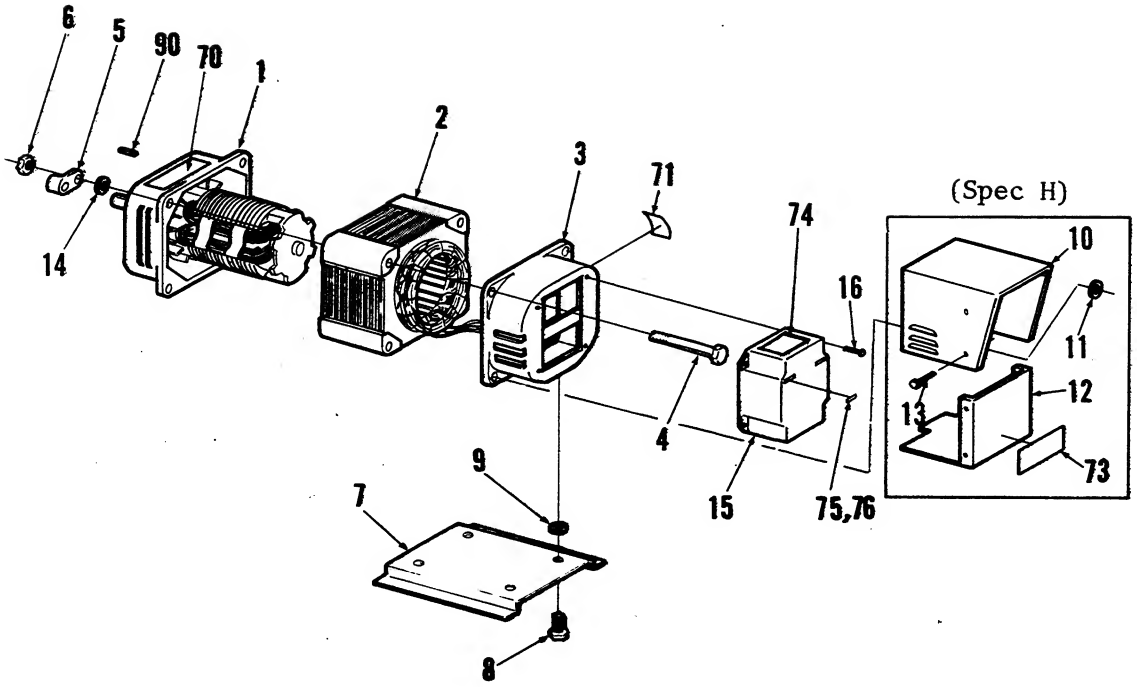
INDEX

INTRODUCTION

This catalog applies to the standard YCB Alternators listed below (Begin Spec H). Parts are arranged in groups of related items. Each illustrated part is identified by a reference number corresponding to the same reference number in the parts list for that group. Parts illustrations are typical. Using the *Model* and *Spec No.* from the nameplate, select the column that applies to your set *Model* and *Spec No.* This Parts Column represents parts that differ between models. Right and left sides are determined by *facing* the PTO shaft end (front) of the set.

PART DESCRIPTION	QUANTITY USED										
	A	B	C	D	E	F	G	H	J	K	L
1.7YCB-1S Use Column A 120 Volt, 60 Hertz	X										
2.2YCB-1S Use Column B 120 Volt, 60 Hertz		X									
3.0YCB-1S Use Column C 120 Volt, 60 Hertz (Spec H Only)			X								
3.0YCB-3S Use Column D 120/240 Volt, 60 Hertz				X							
3.7YCB-3S Use Column E 120/240 Volt, 60 Hertz					X						
5.0YCB-1S Use Column F 120 Volt, 60 Hertz (Spec H Only)						X					
5.0YCB-3S Use Column G 120/240 Volt, 60 Hertz							X				
6.5YCB-3S Use Column H 120/240 Volt, 60 Hertz								X			

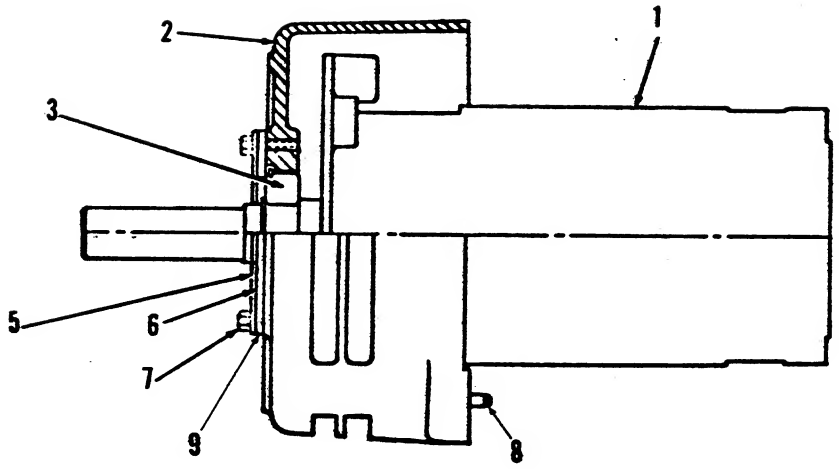
ALTERNATOR ASSEMBLY



REF NO.	PART NUMBER	PART DESCRIPTION	QUANTITY USED										
			A	B	C	D	E	F	G	H	J	K	L
1		Rotor and Adapter Assembly (See separate illustration for Component Parts)	1	1	1	1	1	1	1	1			
2	STATOR	WOUND											
	220-3101	120 Volt	1										
	220-3102	120 Volt		1									
	220-3105	120 Volt and 120/240 Volt			1	1							
	220-3106	120/240 Volt					1						
	220-3107	120 Volt and 120/240 Volt						1	1				
	220-3108	120/240 Volt								1			
3	211-0341	Bell Assembly, End (See separate illustration for Component Parts)	1	1	1	1	1	1	1	1			
4	800-0018	Screw, Cap-Hex Head (1/4-20x3-3/4")	4										
4	800-0021	Screw, Cap-Hex Head (1/4-20x4-1/2")		4									
4	800-0187	Screw, Cap-Hex Head (1/4-20x5")			4	4							
4	800-0185	Screw, Cap-Hex Head (1/4-20x5-1/2")					4						
4	800-0188	Screw, Cap-Hex Head (1/4-20x6-1/2")						4					
4	800-0186	Screw, Cap-Hex Head (1/4-20x7")							4				
4	800-0192	Screw, Cap-Hex Head (1/4-20x8")								4			

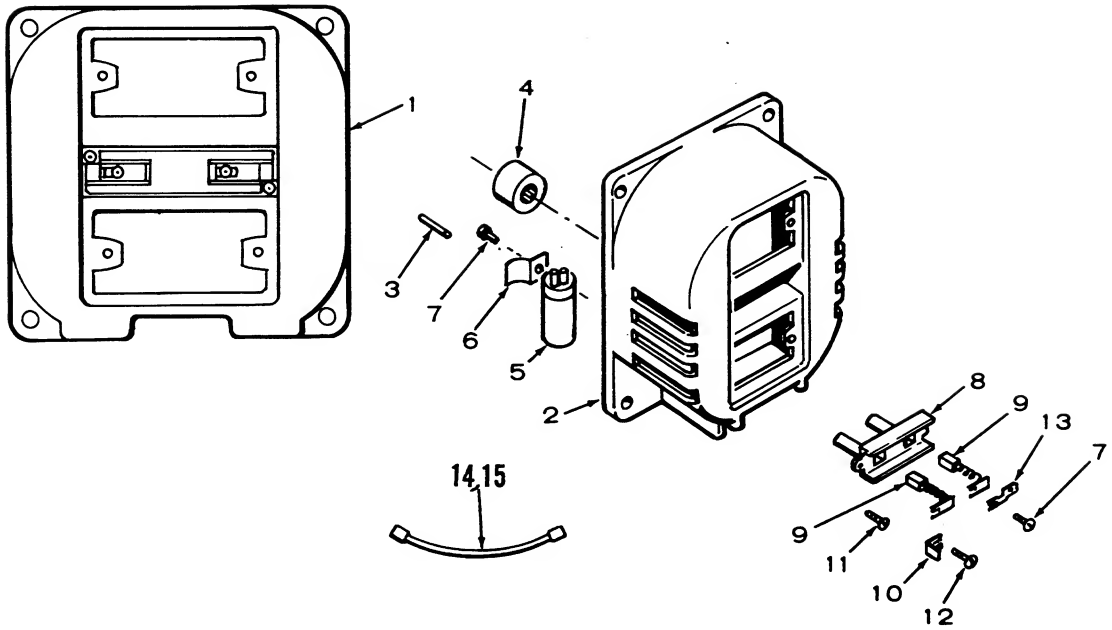
REF NO.	PART NUMBER	PART DESCRIPTION	QUANTITY USED										
			A	B	C	D	E	F	G	H	J	K	L
5	332-2178	Lug, Single Terminal	1	1	1	1	1	1	1	1			
6	870-0232	Nut, Hex - W/ET (1/4-20)	4	4	4	4	4	4	4	4			
7	232-2849	Base, Mounting	1	1	1	1	1						
7	232-2848	Base, Mounting						1	1	1			
8	815-0384	Screw, Cap - Hex Head (3/8-16x3/4")	4	4	4	4	4	4	4	4			
9	526-0030	Washer, Flat - Spec J (13/32 ID x 7/8 OD x 1/8" Thk)	4	4		4	4		4	4			
10	301-4755	Wrapper, Receptacle Panel (Spec H)	1	1	1	1	1	1	1	1			
11	854-0014	Washer, Lock - IT (1/4") (Spec H)	2	2	2	2	2	2	2	2			
12	CONTROL, ASSEMBLY (Spec H) (See Separate Group for Component Parts)												
	300-1909		1	1									
	300-1779				1								
	300-1891					1	1		1	1			
	300-1780							1					
13	815-0498	Screw, Cap - Hex Head - Self Tapping (8-32 x 3/8") (Spec H)	4	4	4	4	4	4	4	4			
14	856-0006	Washer, Lock - EIT (Spec J) (1/4")	1	1		1	1		1	1			
15	CONTROL, ASSEMBLY (Spec J) (See Separate Group for Component Parts)												
	300-2562					1	1		1	1			
	300-2609		1	1									
16	815-0476	Screw, Pan Head (Spec J) (10-32 x 1/2")	4	4		4	4		4	4			
70	98-3575	Label, Caution (Spec H)	1	1	1	1	1	1	1	1			
71	98-4132	Label, Caution (Spec J)	1	1		1	1		1	1			
73	98-3986	Decal (Spec H)	1										
73	98-3987	Decal (Spec H)		1									
73	98-3988	Decal (Spec H)			1	1							
73	98-3989	Decal (Spec H)					1						
73	98-3990	Decal (Spec H						1	1				
73	98-3991	Decal (Spec H)								1			
74	LABEL, RECEPTACLE BOX (Spec J)												
	98-4308		1										
	98-4309			1									
	98-4310					1							
	98-4311						1						
	98-4312								1				
	98-4313									1			
75	98-4484	Label, 120 Volt (Spec J)	2	2		1	1		1	1			
76	98-4485	Label, 240 Volt (Spec J)				1	1		1	1			
90	515-0026	Key (3/16 x 1-7/16")	1	1	1	1	1	1	1	1			

ROTOR AND ADAPTER



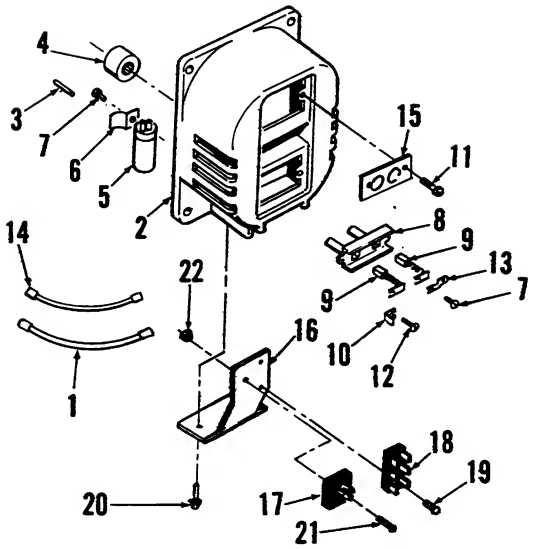
REF NO.	PART NUMBER	PART DESCRIPTION	QUANTITY USED										
			A	B	C	D	E	F	G	H	J	K	L
1	201-2764	Rotor (Includes Bearing)	1										
1	201-2759	Rotor (Includes Bearing)		1									
1	201-2760	Roter (Includes Bearing)			1	1							
1	201-2761	Roter (Includes Bearing)					1						
1	201-2762	Rotor (Includes Bearing)						1	1				
1	201-2763	Rotor (Includes Bearing)								1			
2	231-0225	Adapter, End (Includes 4 Locating Pins)	1	1	1	1	1	1	1	1			
3	510-0108	Bearing, Roller (Includes Snap Ring)	1	1	1	1	1	1	1	1			
5	232-2622	Plate, Bearing	1	1	1	1	1	1	1	1			
6	232-2588	Plate, Bearing Retainer	1	1	1	1	1	1	1	1			
7	815-0359	Screw, Cap-Hex Head (#10-32x7/8")	3	3	3	3	3	3	3	3			
8	516-0196	Pin, Locating - Adapter	4	4	4	4	4	4	4	4			
9	518-0010	Ring, Retaining - Roller Bearing	1	1	1	1	1	1	1	1			

END BELL - SPEC H



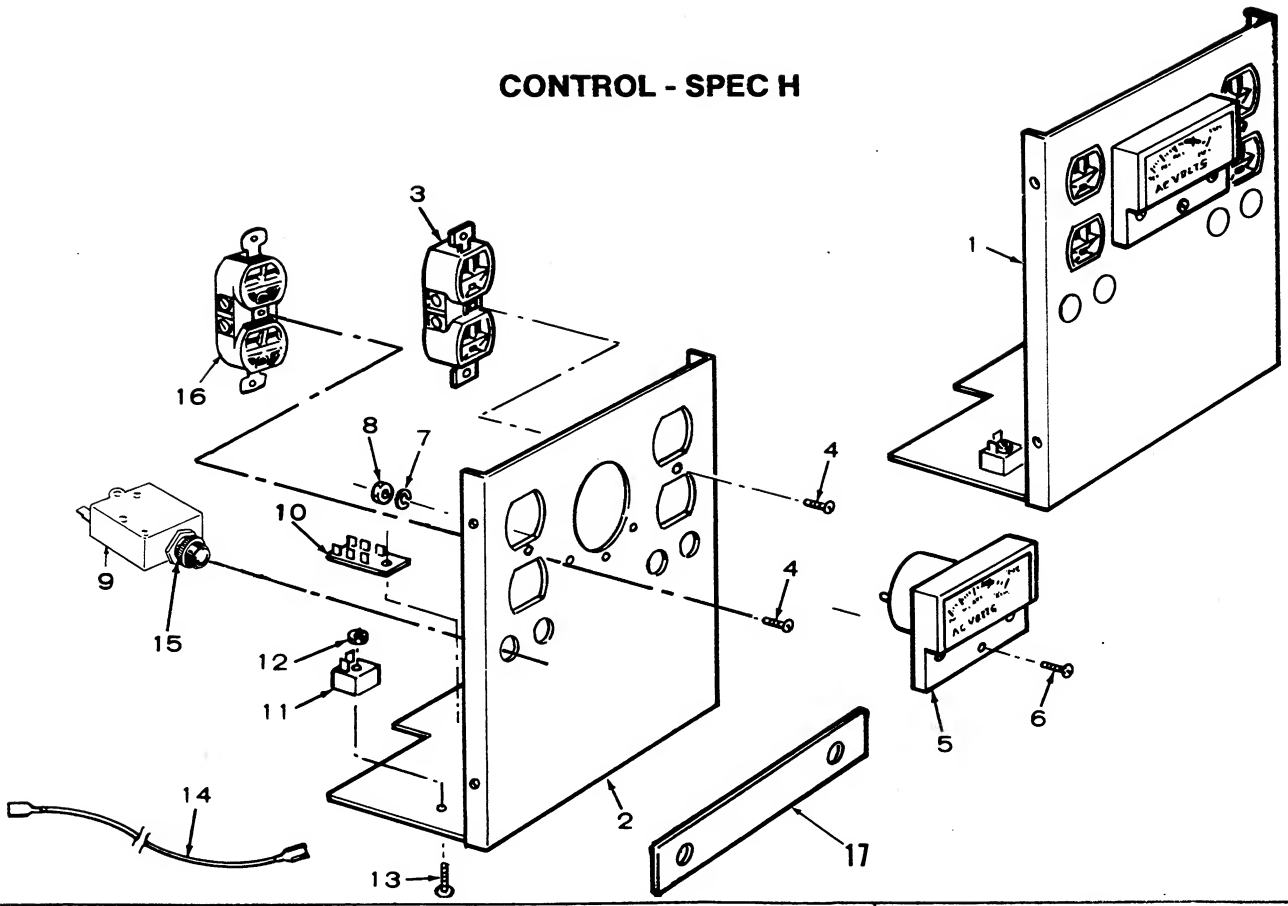
REF NO.	PART NUMBER	PART DESCRIPTION	QUANTITY USED										
			A	B	C	D	E	F	G	H	J	K	L
1	211-0301	Bell Assembly, Complete	1	1	1	1	1	1	1	1			
2	211-0352	Bell Only (Includes 4 Locating Pins)	1	1	1	1	1	1	1	1			
3	516-0196	Pin, Locating - End Bell	4	4	4	4	4	4	4	4			
4	510-0107	Bearing, Roller - Cage Type	1	1	1	1	1	1	1	1			
5	356-0056	Capacitor	1	1	1	1	1	1	1	1			
6	312-0194	Bracket, Capacitor Mounting	1	1	1	1	1	1	1	1			
7	815-0395	Screw, Tapping - Pan Head (#6 x 3/8")	2	2	2	2	2	2	2	2			
8	212-1249	Guide, Brush	1	1	1	1	1	1	1	1			
9	214-0099	Brush	2	2	2	2	2	2	2	2			
10	332-1564	Terminal, Tab	1	1	1	1	1	1	1	1			
11	815-0395	Screw, Tapping - Pan Head (#6x3/8")	2	2	2	2	2	2	2	2			
12	815-0466	Screw, Cap - Hex Head (#6x5/8")	1	1	1	1	1	1	1	1			
13	332-2194	Terminal, Tab	2	2	2	2	2	2	2	2			
14	336-3254	Lead (3-1/4")	1	1	1	1	1	1	1	1			
15	336-4251	Lead (3")	1	1	1	1	1	1	1	1			

END BELL - SPEC J



REF NO.	PART NUMBER	PART DESCRIPTION	QUANTITY USED									
			A	B	C	D	E	F	G	H	J	K	L
	211-0341	End Bell Assembly, Complete	1	1		1	1		1	1			
1	336-7518	Lead, Brush - Negative Brush to Tab Terminal (3-1/2")	1	1		1	1		1	1			
1	336-2847	Lead, Brush - Positive Brush to Rectifier	1	1		1	1		1	1			
2	211-0352	Bell Only, End (Includes 4 Locating Pins)	1	1		1	1		1	1			
3	516-0196	Pin, Locating - End Bell	4	4		4	4		4	4			
4	510-0107	Bearing, Roller - Cage Type	1	1		1	1		1	1			
5	356-0056	Capacitor	1	1		1	1		1	1			
6	312-0194	Bracket, Capacitor Mounting	1	1		1	1		1	1			
7	815-0395	Screw, Tapping - Pan Head (#6 x 3/8")	1	1		1	1		1	1			
8	212-1249	Guide, Brush	1	1		1	1		1	1			
9	214-0099	Brush	2	2		2	2		2	2			
10	332-1564	Terminal, Tab	1	1		1	1		1	1			
11	815-0395	Screw, Tapping - Pan Head (#6 x 3/8")	2	2		2	2						
12	815-0466	Screw, Cap - Hex Head (#6 x 5/8")	1	1		1	1		1	1			
13	332-2194	Terminal, Tab	2	2		2	2		2	2			
14	336-3254	Lead, Capacitor (3-1/4")	1	1		1	1		1	1			
14	336-4251	Lead, Capacitor (3")	1	1		1	1		1	1			
15	211-0345	Plate, Guard	1	1		1	1						
16	232-2840	Bracket, Rectifier	1	1		1	1		1	1			
17	305-0548	Bridge, Rectifier	1	1		1	1		1	1			
18	332-2139	Terminal, Tab	1	1		1	1		1	1			
19	818-0178	Rivet, Dome Head (Aluminum 1/8" x 3/16")	2	2		2	2		2	2			
20	815-0476	Screw, Pan Head (#10 - 32 x 1/2")	2	2		2	2		2	2			
21	815-0565	Screw, Tapping - Hex Head (#8 - 32 x 3/4")	1	1		1	1		1	1			
22	860-0008	Nut, Hex (#8 - 32)	1	1		1	1		1	1			

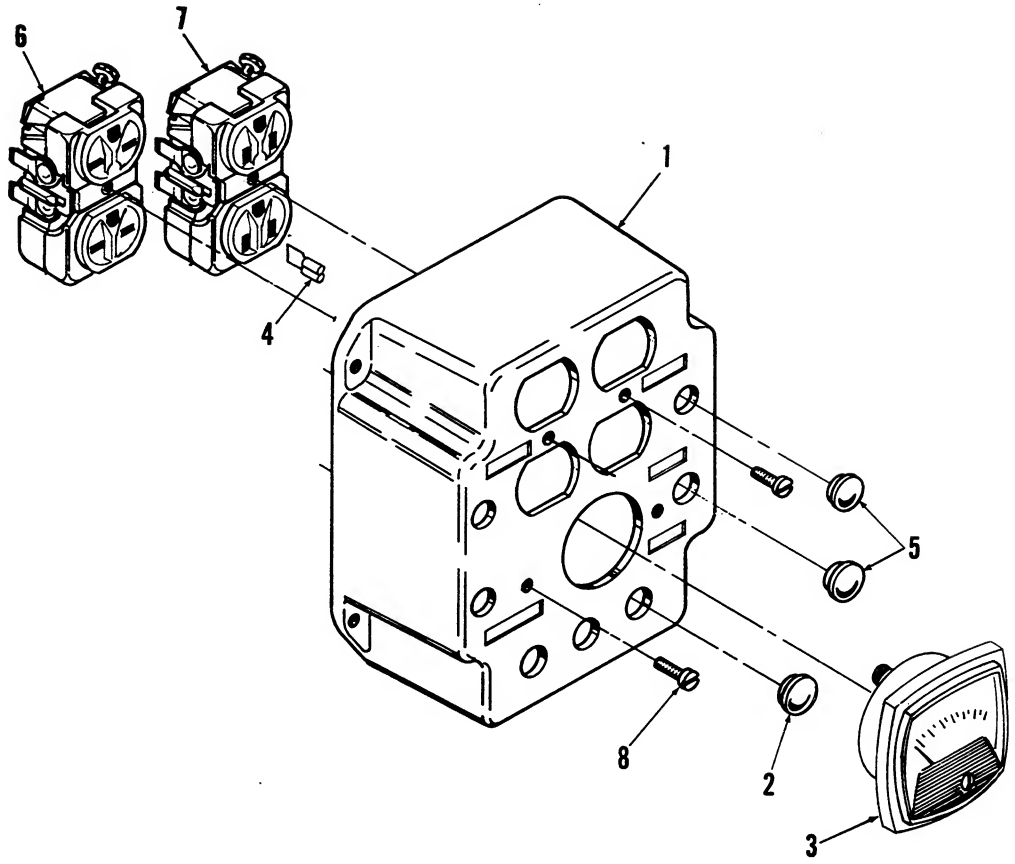
CONTROL - SPEC H



REF NO.	PART NUMBER	PART DESCRIPTION	QUANTITY USED										
			A	B	C	D	E	F	G	H	J	K	L
1	300-1909	Control Assembly, Complete (Includes Parts Marked a)	1	1									
1	300-1779	Control Assembly, Complete (Includes Parts Marked b) - To Replace Complete, Order 300-1909			1								
1	300-1891	Control Assembly, Complete (Includes Parts Marked c)				1	1		1	1			
1	300-1780	Control Assembly, Complete (Includes Parts Marked d) - To Replace Complete, Order 300-1909						1					
2	301-4786	Panel, Receptacle a, b, c, d	1	1	1	1	1	1	1	1			
3	323-1104	Receptacle, Duplex a, b, c, d	2	2	2	1	1	2	1	1			
4	822-2030	Screw, Machine - Pan Head W/ET (#6-32 x 3/8") a, b, c, d	2	2	2	2	2	2	2	2			
5	302-1165	Voltmeter, AC a, b, c, d	1	1	1	1	1	1	1	1			
6	812-0034	Screw, Machine - Round Head (#4-40 x 3/4") a, b, c, d	2	2	2	2	2	2	2	2			
7	853-0001	Washer, Lock - ET (#4) a, b, c, d	2	2	2	2	2	2	2	2			
8	860-0003	Nut, Hex (#4-40) a, b, c, d	2	2	2	2	2	2	2	2			
9	320-0540	Breaker, Circuit a, b, c, d	4	4	4	4	4	4	4	4			
10	332-2139	Terminal, Tab a, b, c, d	1	1	1	1	1	1	1	1			
11	305-0548	Rectifier, Bridge a, b, c, d	1	1	1	1	1	1	1	1			
12	860-0008	Nut, Hex (#8-32) a, b, c, d	1	1	1	1	1	1	1	1			
13	822-2050	Screw, Machine - Pan Head W/ET (#8-32 x 3/4")	1	1	1	1	1	1	1	1			

CONTROL - SPEC H

REF NO.	PART NUMBER	PART DESCRIPTION	QUANTITY USED									
			A	B	C	D	E	F	G	H	J	K	L
14	LEAD (#14 WIRE)												
	336-4260	4" Long			1			1					
	336-2987	10" Long			1			1					
14	LEAD (#16 WIRE)												
	336-4272	8" Long (Rectifier to Positive Brush)	1	1	1	3	3	1	3	3			
	336-4278	4" Long (Voltmeter Positive to Receptacle)	2	2	1	1	1	1	1	1			
	336-2369	4" Long (Voltmeter Negative to Receptacle			1		1						
	336-2847	4" Long (Circuit Breaker to Receptacle)	4	4	3	4	4	3	4	4			
	336-4273	4" Long (Circuit Breaker to Receptacle)			1			1					
	336-4270	3" Long	2	2	2			2					
	336-4271	9" Long	1	1	1			1					
	336-2848	8" Long (Ground to Negative Brush)	1	1	1	1	1	1	1	1			
15	854-0023	Washer, Lock - IT (7/16")	4	4	4	4	4	4	4	4			
16	323-1105	Receptacle, Duplex-Tandem Blades c				1	1		1	1			
17	232-2829	Spacer, Bracket - Receptacle Panel (Optional)	1	1	1	1	1	1	1	1			



REF NO.	PART NUMBER	PART DESCRIPTION	QUANTITY USED									
			A	B	C	D	E	F	G	H	J	K	L
	300-2562	Control Assembly, Complete				1	1		1	1			
	300-2609	Control Assembly, Complete	1	1									
1	301-6303	Box, Receptacle	1	1		1	1		1	1			
2	517-0133	Plug, Hole (1/2" Hole)	4	4		4	4		4	4			
3	302-1435	Voltmeter, AC	1	1		1	1		1	1			
4	332-1571	Terminal, Tab Adapter				1	1		1	1			
5	517-0132	Plug, Hole (7/16" Hole)	3	3		3	3		3	3			
6	323-1105	Receptacle (15 Amp, 250 Volt)				1	1		1	1			
7	323-1104	Receptacle (15 Amp, 125 Volt)	2	2		1	1		1	1			
8	822-2030	Screw, Pan Head W/ET (6-32 x 3/8")	2	2		2	2		2	2			

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